

P1.1

Evaluate each of the following expressions for the complex number $z = \frac{1}{2}e^{j\pi/4}$.

(a) $\text{Re}\{z\}$

(b) $\text{Im}\{z\}$

(c) $|z|$

(d) $\angle z$

P1.3

Using Euler's formula, $e^{j\theta} = \cos \theta + j \sin \theta$, derive the following relations:

(a) $\cos \theta = \frac{e^{j\theta} + e^{-j\theta}}{2}$

(b) $\sin \theta = \frac{e^{j\theta} - e^{-j\theta}}{2j}$

Plotting Signals:

1. Sketch the following signals:

a)

$$x(t) = \begin{cases} 0 & \text{if } t < -4 \\ t + 2 & \text{if } -4 \leq t < 3 \\ t - 2 & \text{if } 3 \leq t \end{cases}$$

b) $y(t) = x(t-1)$ where $x(t)$ is defined in part a)

c)

$$x[n] = \begin{cases} 0 & \text{if } n < 2 \\ 2n - 4 & \text{if } 2 \leq n < 4 \\ 4 - n & \text{if } 4 \leq n \end{cases}$$

d) $y[n] = x[n+1]$ where $x[n]$ is defined in part c)

1.1. A continuous-time signal $x(t)$ is shown in Fig. 1-17. Sketch and label each of the following signals.

(a) $x(t - 2)$; (b) $x(2t)$; (c) $x(t/2)$; (d) $x(-t)$

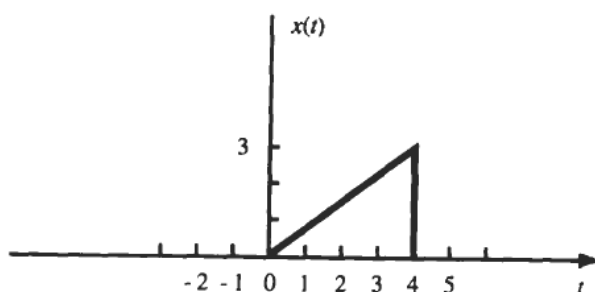


Fig. 1-17

1.2. A discrete-time signal $x[n]$ is shown in Fig. 1-19. Sketch and label each of the following signals.

(a) $x[n - 2]$; (b) $x[2n]$; (c) $x[-n]$; (d) $x[-n + 2]$

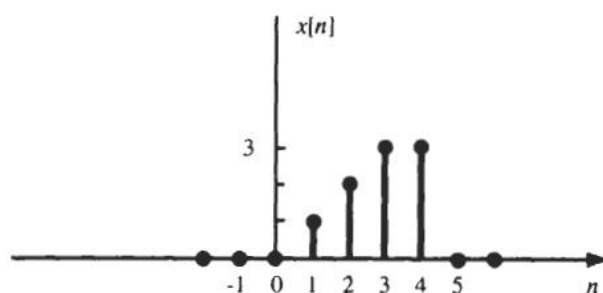


Fig. 1-19

P3.1

Sketch each of the following signals.

(a) $x[n] = \delta[n] + \delta[n - 3]$

(b) $x[n] = u[n] - u[n - 5]$

(c) $x[n] = \delta[n] + \frac{1}{2}\delta[n - 1] + (\frac{1}{2})^2\delta[n - 2] + (\frac{1}{2})^3\delta[n - 3]$

(d) $x(t) = u(t + 3) - u(t - 3)$

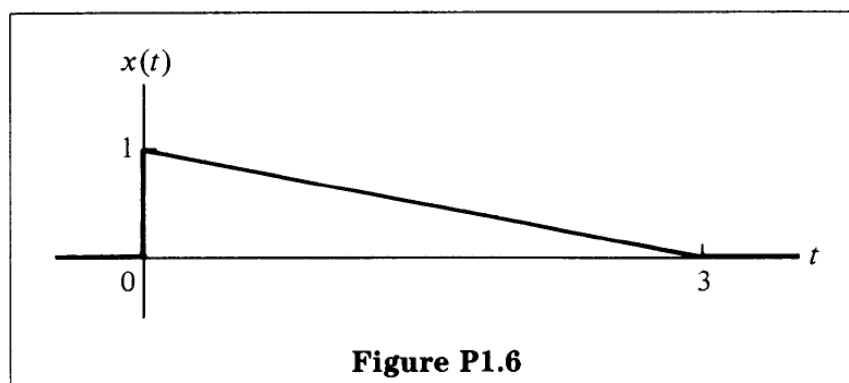
(e) $x(t) = \delta(t + 2)$

(f) $x(t) = e^{-t}u(t)$

P1.6

For $x(t)$ indicated in Figure P1.6, sketch the following:

- (a) $x(-t)$
- (b) $x(t + 2)$
- (c) $x(2t + 2)$
- (d) $x(1 - 3t)$



1.11 Express the sequence

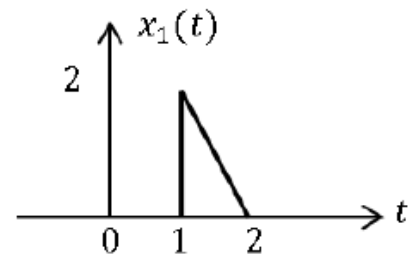
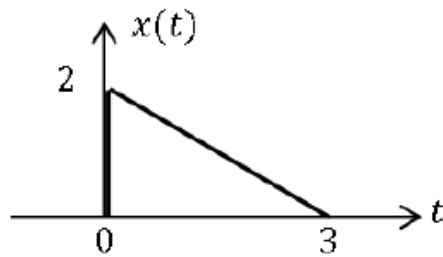
$$x(n) = \begin{cases} 1 & n = 0 \\ 2 & n = 1 \\ 3 & n = 2 \\ 0 & \text{else} \end{cases}$$

as a sum of scaled and shifted unit steps.

1.7 Given the sequence $x(n] = (6 - n)[u(n) - u(n - 6)]$, make a sketch of

- (a) $y_1(n) = x(4 - n)$
 - (b) $y_2(n) = x(2n - 3)$
 - (c) $y_3(n) = x(8 - 3n)$
 - (d) $y_4(n) = x(n^2 - 2n + 1)$
-

1. Cili është relacioni mes sinjaleve $x(t)$ dhe $x_1(t)$ të skicuara në vijim?



a) $x_1(t) = x(t - 1);$

b) $x_1(t) = x(3t - 3);$

c) $x_1(t) = x\left(\frac{t}{3} + 1\right);$

d) $x_1(t) = x(t + 1);$

Detyre kollokviumi – provimi

1. Le të jetë $x(t)$ një sinjal që ka vlerën $x(t) = 0$ për $3 < t < 8$. Për secilin nga sinjalet e mëposhtme, përcaktoni vlerën e t -së për të cilën garantohet vlera e sinjalit të jetë zero:

a) $x_1(t) = x(1 - t) + x(2 - t);$

b) $x_2(t) = x(1 - t)x(2 - t)$

c) $x_3(t) = x(3t);$

d) $x_4(t) = x(t/2)$

1.23. A discrete-time signal $x[n]$ is shown in Fig. 1-29. Sketch and label each of the following signals.

(a) $x[n]u[1 - n];$ (b) $x[n]\{u[n + 2] - u[n]\};$ (c) $x[n]\delta[n - 1]$

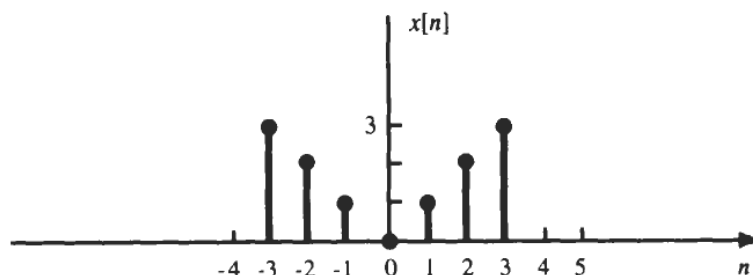


Fig. 1-29

PERIODICITETI

Trajta e përgjithshme e sinjalit sinusoidal: $x(t) = A \cdot \sin(\omega_0 t) = A \cdot \sin(2\pi f_0 t)$

1. For the following signals, (i) determine analytically which are periodic (if periodic, give the period) and (ii) sketch the signals. (Scale your time axis so that a sufficient amount of the signal is being plotted.).

- a) $x(t) = 4 \cos(5\pi t)$
 - b) $x(t) = 4 \cos(5\pi t - \pi/4)$
 - c) $x(t) = 4u(t) + 2\sin(3t)$
 - d) $x(t) = u(t) - 1/2$
 - e) $x[n] = 4 \cos(\pi n)$
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Përcaktoni nëse sinjali i mëposhtëm është periodik, dhe nëse PO, sa është perioda e përgjithshme e sinjalit:

$$x(t) = \cos\left(\frac{10\pi}{3}t\right) + \sin\left(\frac{5\pi}{4}t\right)$$

Detyre provimi

1. Skiconi për disa intervale kohore dhe tregoni nëse janë periodike sinjalet e mëposhtme:

- a) $x_1(t) = 2 \cdot \sin(\omega_0 t)$, ku $f_0 = 4 \text{ Hz}$;
- b) $x_2[n] = \cos\left[\frac{1}{4}n\right]$;
- c) $x_3[n] = \cos^2\left[\frac{\pi}{8}n\right]$.